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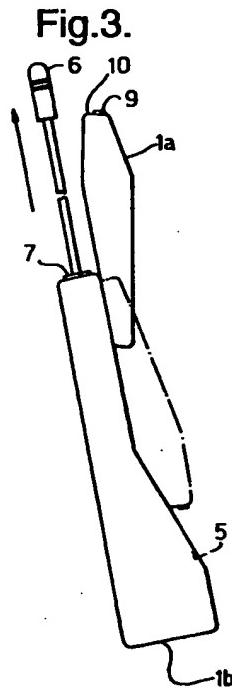
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(54) Portable radio communication apparatus.

(57) A portable radio communication apparatus has an upper casing and a lower casing which are rotatably connected to each other by a shaft. To use the apparatus, the user rotates the upper casing to an unfolded position thereof and then extends a retractable antenna. The upper casing is dimensioned sufficiently smaller than the lower casing, as measured in the lengthwise direction. The lower casing is so tapered as to orient a transmitter portion toward the user's mouth. Even when the upper casing is retracted to over the lower casing, minimum necessary keys on the lower casing remain exposed to the outside. In this configuration, even when the casing is folded, the transmitter portion and a receiver portion do not conceal each other and allow a conversation to be held thereon. Since minimum necessary keys are directly accessible even when the casing is folded, it is not necessary for the user to unfold the casing.



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Background of the Invention

The present invention relates to a portable radio communication apparatus and, more particularly, to a portable radio communication apparatus with improved operability.

Conventional portable radio communication apparatuses include one having a casing which is rotatable at part thereof. Specifically, the casing is rotatable to a folded position to enhance portability or to an unfolded position to allow a communication to be held thereon, as needed. This kind of apparatus is disclosed in, for example, Japanese Patent Laid-Open Publication No. 60-21636. As shown in FIGS. 16 - 18 of the Laid-Open Publication, the apparatus has an upper casing 32 and a lower casing 31 which are rotatable toward and away from each other about an axis a. The upper and lower casings 32 and 31 each has a wedge-like configuration, as viewed in a sectional side elevation. In a folded position, the thicker ends of the wedge-shaped casings 32 and 31 each form a standing surface 34.

However, the conventional apparatus described above has some problems left unsolved, as follows. When the casing is folded by rotation, a transmitter portion or microphone and a receiver portion or speaker included in the casing entirely conceal each other, preventing a conversation from being held thereon. Further, keys provided on the casing are exposed to the outside at all times and apt to invite erroneous operation. In addition, since the transmitter portion is not oriented toward the user's mouth, conversation quality is likely to fall due to noise, among others.

As used herein the term "speaker" includes any suitable transducer for producing an audio output from an electrical signal, and "microphone" means any suitable transducer for producing an electrical signal from an audio input.

Summary of the Invention

It is therefore an object of the present invention to provide a portable radio communication apparatus which is easy to operate and allows a minimum of erroneous operation to occur.

A portable communication apparatus of one aspect of the present invention has a first casing having a receiver portion, and a second casing having at least keys and a transmitter portion and connected to the first casing by a pivot to turn in a plane substantially parallel to the rear surface of the first casing. The first casing has a smaller overall length than the second casing such that even when the first casing is retracted, at least one of the keys and the transmitter portion are exposed to the outside.

In another aspect the invention provides a portable communication apparatus comprising:

- a first casing having a speaker portion;
- a second casing having a surface with operating keys and a microphone portion;
- 5 the first casing being connected to the second casing so as to be moveable generally parallel to the said surface between an open position and a closed position in which the first casing overlays the said surface, the first casing having a smaller overall length than the second casing such that at least one of the keys and the microphone portion remain exposed when the first casing overlays said surface.
- 10
- 15 The first casing may be pivotally connected to the second casing for rotation about an axis projecting from the said surface.
- 20 The apparatus of the present invention allows a conversation to be held thereon even when the casings thereof are folded or otherwise overlaid one on the other. This is because the upper casing is sufficiently shorter than the lower casing and prevents the receiver portion from covering the transmitter portion when the casing is folded. Even
- 25 when the casing is folded, minimum necessary keys remain uncovered and can be operated, as desired. Hence, the user of the apparatus does not have to unfold the casing in the event of operating such keys. The transmitter portion is so configured as to face the user's mouth, thereby ensuring high communication quality. Furthermore, the power key is provided on the top of the upper casing and is, therefore, brought to a position where it is not easy to operate when the casing is folded.
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Brief Description of the Drawings

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description taken with the accompanying drawings in which:

- Fig. 1 is a front view showing a portable radio communication apparatus embodying the present invention in an unfolded position;
- 45 Fig. 2 is a view similar to Fig. 1, showing the embodiment in a folded position; and
- Fig. 3 is a side elevation showing the embodiment in the unfolded position.

Detailed Description of the Preferred Embodiment

Referring to Figs. 1, 2 and 3, a portable radio communication apparatus embodying the present invention is shown and includes a casing 1. The casing 1 is made up of an upper casing 1a having a receiver portion or speaker 2, and a lower casing 1b having a display 3, keys 4, and a transmitter

portion or a microphone 5. The upper casing 1a is pivotably connected to an upper portion of the lower casing 1b by a pivot shaft 1c. A retractable antenna 6 is mounted on the top 7 of the lower casing 1b. The antenna 6 is extendable from and in the lengthwise direction of the casing 1b.

As shown in Fig. 1, the upper casing 1a can turn about the pivot 1c in a direction C-D (or C-E), generally parallel to the front surface of the lower casing 1b containing the keys 4 and display 3. After the upper casing 1a has been brought to the position shown in Fig. 1, the antenna 6 is extended from the lower casing 1b. In this condition, the apparatus is ready to communicate with a remote station. The upper casing 1a is dimensioned sufficiently smaller than the lower casing 1b, as measured in the lengthwise direction. Therefore, even when the apparatus is folded, so that the upper casing 1a overlays the front surface of the casing 1b as shown in Fig. 2, the upper casing 1a does not cover the transmitter 5 of the lower casing 1b.

As best shown in Fig. 3, the lower portion of the lower casing 1b is tapered such that the transmitter 5 faces the user's mouth. In addition, the upper casing 1a is dimensioned small enough to leave minimum necessary ones of the keys 4 exposed to the outside when it is folded to the position of Fig. 2. The minimum necessary keys, for example, include a send key for making a call, and an end key for terminating a call. A power key 9 is not included in the keys 4, but it is provided on the top 10 of the upper casing 1a, as viewed in Fig. 1. This prevents the user from operating the power key 9 by accident when the apparatus is folded, i.e., when the upper casing 1a is held in the position of Fig. 1.

In summary, it will be seen that the present invention provides a foldable portable radio communication apparatus which allows a conversation to be held thereon even when a casing thereof is folded. This is because the casing has an upper part which is sufficiently shorter than a lower part and prevents a receiver portion from covering a transmitter portion when the casing is folded. Even when the casing is folded, minimum necessary keys remain uncovered and can be operated, as desired. Hence, the user of the apparatus does not have to unfold the casing in the event of operating such keys. The transmitter portion is so configured as to face the user's mouth, thereby ensuring high communication quality. Furthermore, a power key is provided on the top of the upper casing and is, therefore, brought to a position where it is not easy to operate when the casing is folded.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated

features.

The appended abstract as filed herewith is included in the specification by reference.

5 Claims

1. A portable communication apparatus comprising:
10 a first casing having a receiver portion;
and
a second casing having at least keys and
15 a transmitter portion and connected to said
first casing by a pivot so that the first casing
can turn in a plane substantially parallel to said
first casing between an open position and a
retracted position overlapping the second cas-
ing;
said first casing having a smaller overall
length than said second casing such that even
20 when said first casing is retracted, at least one
of said keys and said transmitter portion are
exposed to the outside.
2. An apparatus as claimed in Claim 1, wherein
25 said transmitter portion protrudes from said
second casing.
3. An apparatus as claimed in Claim 1 or Claim 2,
30 further comprising a power key provided on a
top of said first casing.
4. An apparatus as claimed in any preceding
35 claim, wherein a lower portion of said second
casing is tapered such that said transmitter
faces a user's mouth.
5. An apparatus as claimed in any preceding
40 claim, wherein said at least one key is one of a
send key and an end key.
6. A portable communication apparatus comprising:
45 a first casing having a speaker portion;
a second casing having a surface with
operating keys and a microphone portion;
the first casing being connected to the
second casing so as to be moveable generally
parallel to the said surface between an open
position and a closed position in which the first
casing overlays the said surface, the first cas-
ing having a smaller overall length than the
second casing such that at least one of the
keys and the microphone portion remain ex-
posed when the first casing overlays said sur-
face.
7. An apparatus as claimed in Claim 6, wherein
55 the first casing is pivotally connected to the

second casing for rotation about an axis projecting from the said surface.

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Fig.3.

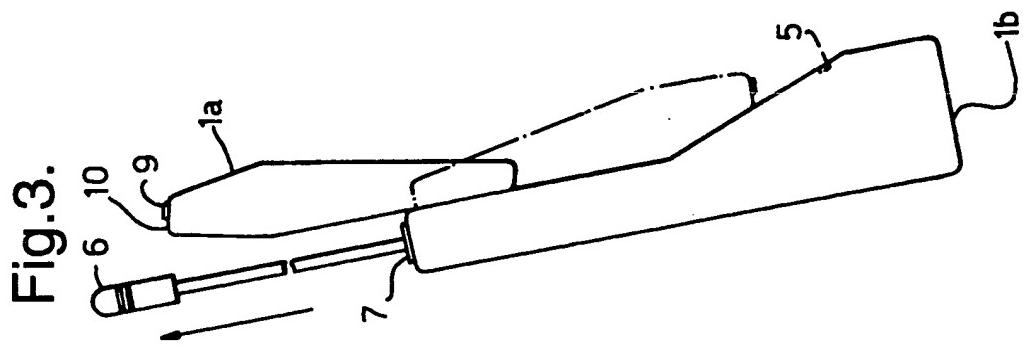


Fig.2.

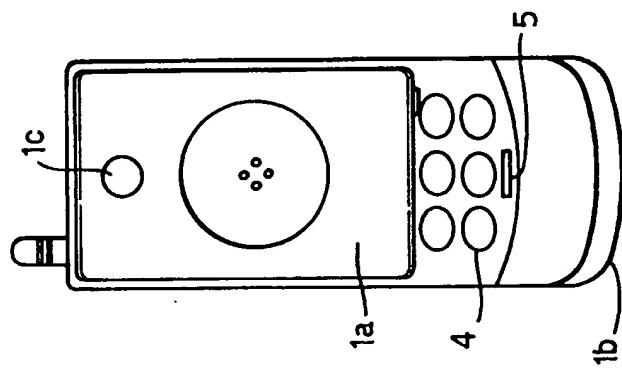
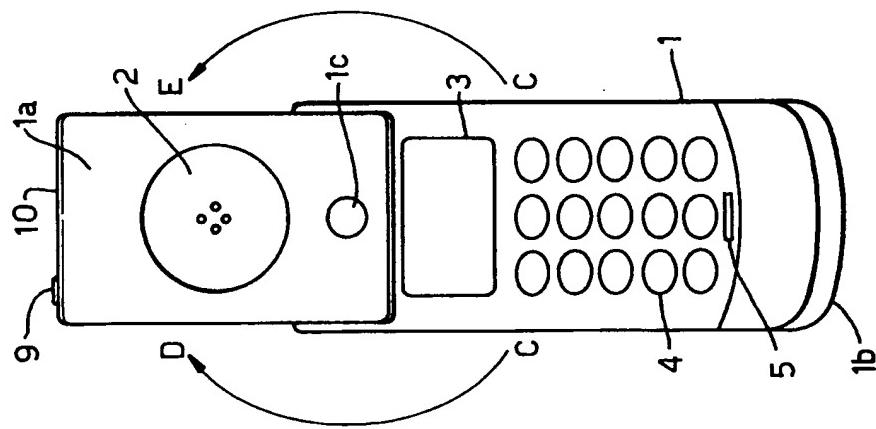


Fig.1.





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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	EP-A-0 414 365 (TECHNOPHONE) * column 4, line 5 - line 41; figures 1-3 *	6	H04B1/38 H04M1/02
Y A	---	1,2,7 3-5	
Y A	DE-A-33 23 858 (BRANDENSTEIN) * page 16, line 6 - page 18, line 17; figures 10-18 *	1,2,7 3-6	

			TECHNICAL FIELDS SEARCHED (Int.Cl.)
			H04B H04M
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	25 April 1995	Andersen, J.G.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date		
A : technological background	D : document cited in the application		
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P : intermediate document	& : member of the same patent family, corresponding document		